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working in the field. Every scientist dealing with the problem of the electronic structure of atoms and molecules in terms of many-electron wave functions and electronic energy calculations (in any other way than using computers up to the n th decimal place!) should be interested in its contents. I also suspect that even those quantum chemists concerned only in ground-state energy calculations of molecular wave functions will also find some interest in its reading.

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Physical Aspects of Lie Group Theory

R. Hermann
271 pp. Les Presses de l'Université de Montréal, Montréal, 1974. \$9.50

This book resulted from lectures given by the author at the Université de Montréal in 1972. It treats several topics in abstract harmonic analysis and representation theory, and their applications in physics. More specifically, the book develops connections between physics and Lie group theory and geometry, with particular emphasis on the connections between operator theory (mainly resolvent theory) and Fourier analysis on Lie groups. To some extent the present book is a continuation of the author's earlier book *Fourier Analysis on Groups and Partial Wave Analysis* (W. A. Benjamin, 1969), although knowledge of the earlier book is not a prerequisite for reading this one.

The level of presentation of the book is fairly elementary (for this area of mathematical physics or applied mathematics), partly because the author eschews mathematical rigor and epsilon-ics. Consequently, the material in this book should be accessible to anyone with an elementary knowledge of functional analysis, Lie-group theory, and quantum-field theory. A related, but more difficult, book is Krzysztof Maurin's *General Eigenfunction Expansions and Unitary Representations of Topological Groups* (Polish Scientific Publishers, 1968).

Some mathematical topics of physical interest that are discussed are Heisenberg Lie algebras and their representations, deformations of various mathematical structures (such as Lie groups), an abstract Lie-algebraic method of quantizing free fields and an abstract formulation of classical scattering theory.

Some shortcomings of the book are the superficiality of the physical applications, a lack of polish which suggests hasty preparation, the generous sprin-



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klings of typographical errors and the lack of an index.

Despite the defects noted above, applied mathematicians and mathematical physicists should find the book of interest.

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Sub-atomic Physics

H. Frauenfelder, E. Henley

554 pp. Prentice-Hall, Englewood Cliffs, N.J., 1974. \$16.50

This is an excellent book. While in present physics curricula there is generally no course well matched to it, the book would be attractive to create such a course, merging into it some topics normally found in courses on introductory quantum mechanics and on introductory nuclear and particle physics.

Sub-atomic Physics covers a broad range of topics, in 19 chapters which are grouped into six major sections: "Tools," "Particles and Nuclei," "Symmetries and Conservation Laws," "Interactions," "Models" and "Nuclear Science and Technology." The book combines very broad coverage with a treatment and presentation which are generally quite deep, and yet unusually lucid and attractive. The authors, highly respected physicists, one a theorist and the other an experimentalist, have a knack for clear explanations, and a style that makes the book sure to become an outstanding text.

The book is intended as an introduction for physicists, at the senior or first-year graduate level. It assumes some knowledge of electromagnetism, relativity, and quantum theory, the latter at the level of Robert Eisberg's *Fundamentals of Modern Physics*. Introductory courses in atomic physics, or quantum theory, are variously found as one-semester or one-year courses; the present book suggests an attractive combination of such an atomic-physics course together with subatomic physics in a one-year program.

Or perhaps it would be better to plan it as a three-semester program. To cover a major part of the present book in a one-semester course would require a stiff pace indeed. Even if one regards the last three chapters, on nuclear power, nuclear astrophysics, and nuclei in chemistry, as optional, and even if one considers that for an introductory course one could make a major condensation of the previous three chapters on nuclear models, many of the preceding chapters each contain such a wealth of material as to call for fairly extended study. Chapter 10, for example, on "The Electromagnetic Interaction," in-

cludes material on time-dependent perturbation theory, phase space, multipole radiation, and on electromagnetic scattering of leptons, and an extended discussion of photon-hadron interactions.

One test of the usefulness of a textbook is whether the student can work through the material largely by himself or herself. In this book, with its clarity, its engaging style, its clear typography and its wealth of references, such relatively independent study would be largely practical for the serious student. There is an extensive set of problems at the end of each chapter. However, it must be remarked that for most of these problems a great deal of outside work, and frequently much outside reading, would be required of the student before answers could be obtained.

In summary, *Sub-atomic Physics* is a highly attractive book, and deserves the strongest consideration by physics instructors.

WALTER SELOVE
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new books

Chemical Physics

Advances in Chemical Physics, Vol. 24: Membranes, Dissipative Structures, and Evolution. G. Nicolis, R. Lefever, eds. 390 pp. Wiley, New York, 1975. \$23.95

Atomic Absorption Spectrometry. M. Pinta, ed. 418 pp. Halsted, New York, 1975. \$95.00

Biochemical Spectroscopy. R. A. Morton. 900 pp. Halsted, New York, 1975. \$197.50

Molecular Spectroscopy. I. N. Levine. 491 pp. Wiley, New York, 1975. \$19.50

Mössbauer Effect Data Index, Covering the 1966-1968 Literature. J. G. Stevens, V. E. Stevens, P. T. Deason Jr, A. H. Muir Jr, H. M. Coogan, R. W. Grant, eds. 522 pp. Plenum, New York, 1975. \$49.50

Mössbauer Effect Data Index, Covering the 1973 Literature. J. G. Stevens, V. E. Stevens, eds. 495 pp. Plenum, New York, 1975. \$49.50

Spectroscopic Data, Vol. 1: Heteronuclear Diatomic Molecules. S. N. Suchard, ed. 1235 pp. Plenum, New York, 1975. \$95.00

Materials and Solid State

Crystals with the Fluorite Structure: Electronic, Vibrational, and Defect Properties. W. Hayes, ed. 448 pp. Oxford U. P., New York, 1974. \$54.50

Diffusion in Solids: Recent Developments. A. S. Nowick, J. J. Burton, eds. 491 pp. Academic, New York, 1975. \$45.00

Electrical Conduction in Solid Materials: Physicochemical Bases and Possible Applications. J. P. Suchet. 213 pp. Pergamon, New York, 1975. \$14.00